10/27/00 A

EXPRESS MAIL LABEL: EE444326364US

PATENT APPLICATION TRANSMITTAL LETTER

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS Docket No. 5785-23

Transmitted herewith for filing of the patent application of

Ronnal P. REICHARD, et al.

for COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME

Enclosed are:

- X Declaration
- 5 Sheets of drawing (3 sets)
- X Assignment of the invention to: COMPSYS, INC.
- ____ Communication Regarding Late Payment of Filing Fee
- ____ Communication Regarding Late Filing of Declaration
- X Verified statement to establish small entity status under 37 C.F.R. 1.9 and 1.27. Independent Inventor
- ____ Information Disclosure Statement, PTO 1449, References
- X Other: (2) postcards

CLAIMS AS FILED			Small Entity		Other than a Small Entity	
FOR	NO. FILED	NO. EXTRA	RATE	FEE	RATE	FEE
Basic Fee				$355		$710
Total Claims	-20- 20	-0-	x $ 9 =	$	x $18 =	$
Indep Claims	-3- 3	-0-	x $40 =	$	x $80 =	$
multiple dependent claim present		NONE	x $135 =	$	x $270 =	$
If the difference in Col. 1 is less than zero, enter "0" in Col. 2			TOTAL	$355	TOTAL	$
			assignment recordal fee	$ 40 $395		$ $

___ Please charge my Deposit Account No. 50-0951 in the amount of $ _____.

X A check in the amount of $ 395.00 is enclosed.

___ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 50-0951. A duplicate of this sheet is enclosed.

- X Any additional filing fees required under 37 C.F.R. 1.16.
- ___ Any patent application processing fees under 37 C.F.R. 1.17.
- ___ No fee enclosed. No fee is authorized.

10/26/00
Date

Robert J. Sacco, Reg. No. 35,667

P1001664;1

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  - ___ Any patent application processing fees under 37 C.F.R. 1.17.
  - ___ No fee enclosed. No fee is authorized.

10/26/00
Date

Robert J. Sacco, Reg. No. 35,667

P1001664;1

Applicant or Patentee: Ronnal P. Reichard et al.
Serial or Patent No.:
Attorney Docket No.: 5785-23
Filed or Issued: Herewith
For: COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 C.F.R. 1.9(f) and 1.27(c)-SMALL BUSINESS CONCERN

I hereby declare that I am

[ ] the owner of the small business concern identified below
[XX] an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN COMPSYS, INC.
ADDRESS OF CONCERN 7705 Technology Drive
West Melbourne, Florida 32904

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 C.F.R. 121.12, and reproduced in 37 C.F.R. 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees in the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled METHOD FOR MAKING COMPOSITE STRUCTURES

by inventor(s) Ronnal P. Reichard et al.
described in

[xx] the specification filed herewith
[ ] application serial no._____, filed_____.
[ ] patent no._____, issued_____.

Mail Label:
EE444326364US Express

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 C.F.R. 1.9(c) or by any concern which would not qualify as a small business concern under 37 C.F.R. 1.9(d) or a nonprofit organization under 37 C.F.R. 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 C.F.R. 1.27)

NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 C.F.R. 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Scott M. Lewit
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING 7705 Technology Drive
West Melbourne, FL 32904

SIGNATURE _____ DATE 10/26/00

P1001578;1

COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application 60/161,561 entitled, "COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME," filed October 26, 1999, the entirety of which is incorporated herein by reference.

Background Of The Invention

Field of Invention

This invention relates to a composite structures and more particularly, the to composite structures which are especially adapted for forming high strength panels suitable for use in applications requiring a capability to withstand point compression loading without deformation.

Description of the Related Art

Composite panels are commonly used in various applications such as cargo containers, vehicles, and boats. In the past, boat transoms have been developed using a variety of different technologies. One prior art technique for forming transoms uses plywood as the core of a sandwich laminate. The plywood acts to augment the structural properties of the fabric layer skins of the transom. Advantageously, plywood provides a low-cost means for strengthening the transom. Additionally, plywood has excellent compressive strength for through bolting and outboard motor clamps. One significant drawback to working with plywood, however, is that it tends to decay significantly, often within five to seven years.

Another prior art technique for forming transoms uses a high-density structural foam core rather than a plywood core. The high-density structural foam

is commonly formed from cross-linked PVC or very high-density urethane. Transoms having high-density structural foam cores commonly maintain their structural integrity for up to ten years. High-density structural foam is considerably more expensive than plywood, however, and is not cost effective to use throughout the entire transom. The high-density foam resists compression resulting from point loading of the transom panel associated with motor mounting bolts. It should be noted that even high density foam will be subject to creep or relaxation over time and in some instances over temperature variations.Yet another prior art technique for forming a transom includes a composite of both high and lower density structural foams. In this technique, high-density structural foam is provided only in areas, which will support through bolts and/or outboard motor clamps, and low-density structural foam is provided in the remaining portions of the transom core. There are several drawbacks to this technique. One drawback is that during transom manufacturing with structural foam, the structural foam is typically attached to a mold using only a few large C-clamps. This attachment structure is not acceptable for a composite structure formed from numerous pieces of foam because each piece of foam would not be attached to the mold. An additional drawback is that properly combining the high and low-density structural foams requires a high degree of precision, and is therefore costly. Besides cost, the techniques previously discussed are poorly designed for manufacturability and production.

U.S. Patent No. 5,429,066 to Lewit *et al.* involves manufacturing a composite structure that has a reinforced fabric layer. A non-woven fabric layer, such as a mat fiber layer, is attached to the reinforcing fabric layer. A structural foam is attached to the non-woven fabric layer on the side of the non-woven fabric layer opposite the reinforcing fabric by filling the interstices of the non-woven fabric layer. However, the Lewit. '066 structure suffers from the inability to resist point compression loads such as those associated with outboard motor mounting bolts.

U.S. Patent No. 5,908,591 to Lewit *el al.* involves manufacturing a composite structure having a structure similar to Lewit '066. Significantly, however, the Lewit '591 composite structure does not make use of a second reinforcing fabric layer. Instead, penetration of the structural foam is controlled so

as to leave an outer portion of the fabric layer of the cured composite structure substantially free of cured resin.

Thus, a need exists for a composite structure that is easily manufacturable and that is able to resist point compression loads such as those associated with outboard motor mounting bolts.

SUMMARY OF THE INVENTION

A composite panel and a method for making same is disclosed which is formed of a foam core and is able to resist compression caused by point compressive loads. In a first aspect of the present invention the method preferably comprises the steps of providing a panel having elongated channels formed therein which are positioned along areas of anticipated point compression loading. The panel is preferably constructed by attaching a reinforcing fabric layer to a non-woven fabric layer forming an outside layer. Additionally, the panel has foam core within the outside layer. The method further comprises providing structural foam channel inserts having an outer fabric layer, wherein the channel inserts have a cross section that matches the cross-sectional profile of each of the elongated channels of the panel. Resin is then applied to the outside layer of the panel and outer fabric layer of the channel inserts such the channel inserts are positioned within the channels of the panel. The resin is then allowed to cure forming a composite structure.

In a second aspect of the present invention, a method of forming high strength panels comprises the steps of providing a panel by attaching a reinforcing fabric layer to a non-woven fabric layer forming an outside layer, wherein the outside layer forms opposing panel surfaces. A plurality of point compressive load bearing members are then arranged between the opposing panel surfaces along areas of anticipated point compression loading, wherein the plurality of point compressive load bearing members forms elongated channels which are applied transversely to opposing surfaces of the panel. The panel and the plurality of point compressive load bearing members are placed within a mold and the plurality of point compressive load bearing members are then secured in place within the panel by injecting the mold with foam providing a foam core to the panel.

In a final aspect of the present invention, a composite structure comprises a panel having elongated channels formed therein which are positioned along areas of anticipated point compression loading, wherein the panel is arranged and constructed by attaching a reinforcing fabric layer to a non-woven fabric layer

forming an outside layer. The composite structure further comprises a plurality of structural foam channel inserts, each insert formed from attaching a reinforcing fabric layer to a non-woven fabric layer to form an outside layer, wherein the channel inserts have a cross section which matches the cross-sectional profile of each of the elongated channels of the panel. Structural foam is attached to the non-woven fabric layer of each of the panel and the plurality of structural foam channel inserts, wherein the structural foam fills interstices of the non-woven fabric layer without penetrating into the reinforcing fabric layer. The plurality of structural foam inserts are mated with the elongated channels of the panel after being saturated with curable resin after the structural foam has been attached to the non-woven fabric layer of each of the channel inserts and of the panel.

Brief Description of the Drawings

Having briefly described the invention, the same will become better understood from the following detailed discussion, read in conjunction with the drawings wherein:

Fig. 1A is a front elevation view of a panel formed in accordance with the invention.

Fig. 1B is a top view of the panel of Fig. 1A.

Fig. 2 is an enlarged cross-sectional view of a channel insert positioned for placement within a channel to form the panel of Fig. 1.

Fig. 3 is an enlarged cross-sectional view of a channel insert positioned within a channel to form the panel of Fig. 1.

Fig. 4 is a flow chart showing a method form making the panel of Fig. 1.

Fig. 5A is a front elevation view of a panel formed in accordance with an alternative embodiment of the invention.

Fig. 5B is a top view of the panel of Fig. 5A.

Fig. 6A shows a load bearing member that can be used with the present invention.

Fig. 6B shows a pair of fabric layers in a mold, ready for positioning of a load-bearing member therein.

Fig. 7 is an enlarged cross-sectional view of a load-bearing member positioned within the panel of Fig. 5.

Detailed Description of the Preferred Embodiments

Figs. 1-3 illustrate a construction for a composite panel in accordance with the invention. The composite panel 7 has a structural foam core 8, 9 and includes one or more outer fabric layers 12, 18 securely attached or fitted thereto. As best shown in Figs. 2 & 3, the fabric layers 12, 18 can be arranged to continuously extend between a first surface 13 of the panel to a second surface 15, so as to traverse through the foam core. The fabric layers thus arranged are soaked in resin and allowed to cure so as to form a rigid cross brace 17 between the panel surfaces 13, 15. The cross bracing 17 resists deformation under conditions of point compression loading applied along an axis perpendicular to the panel surfaces 13 and 15. Referring to FIG. 3, a bolt 60 is optionally shown illustrating a condition of point compression loading upon the composite panel 7. The bolt 60 would be secured in place through the channel insert 16 using washers 61 and 62 and corresponding bolt 64.

The fabric layer 12 is preferably formed from a reinforcing fabric layer 41 and a non-woven inner fabric layer 43, but may alternatively be formed from just a single fabric layer composed of fiberglass mat for example. The reinforcing fabric layer 41 can be formed of any suitable reinforcing fibers. However, the reinforcing fabric layer 41 is preferably a plurality of directional reinforcing fabric layers of organic or inorganic structural reinforcing fabrics such as such as fiberglass, carbon fibers, aramid fibers such as is available under the name Kevlar, linear polyurethane or polypropylene fibers such as is available under the name Spectra, or polyester fibers. By reinforcing fabric is meant a fabric which when added to a composite material enhances the structural properties of the material. The fabrics can be randomly oriented, or preferably, can be oriented in one or more directions. While a number of specific types of materials have been given for use as the reinforcing fabric layer 12, it will be appreciated by those of ordinary skill in the art that other equivalent-type reinforcing fabric layers can be employed in the practice of the invention.

According to a preferred embodiment, the fabric layers can be formed and attached to the foam cores 8, 9 as described in U.S. Patent Nos. 5,429,066 and 5,908,591 to Lewit, which disclosures are expressly incorporated herein by reference. As disclosed in the '066 patent, an inner fabric layer 43 of fabric layer 12 can be a non-woven fabric composed of continuous thermoplastic fiber, needle punched

together to yield a felt-like fabric. One example of such a fabric is Trevira Spunbond, which is commercially available from Hoechst Celanese Corporation. However, the invention is not limited in this regard and the inner fabric layer may be comprised of other materials, including polyester staple mat and glass fiber mat, as well as other organic and inorganic fiber mats and fabrics. It should be understood that fabric layer 18 might be comprised of a reinforcing fabric layer 45 and a non-woven inner fabric layer 47 similar to fabric layers 41 and 43 respectively.

Preferably the foam cores 8, 9 are formed of a self-expanding, self-curing urethane foam. The foam preferably expands and penetrates into the interstices of an inner one (43) of the fabric layers 12 by filling into a mold in an amount sufficient to cause pressure as a result of expansion of the foam 8, 9. Such self-rising, self-curing foam is preferably a urethane foam commercially available from BASF, MOBAY, PPG and is typically an MDI-based rigid polyurethane foam (methylene-diphenyl-methane diisocyanate) using "hydrogenated chlorofluorocarbons" (HCFC), water and/or $C0_2$ as a blowing agent. However, the invention is not limited in this regard, and any other suitable self-expanding structural foam can be used for this purpose.

As an alternative, the fabric layers 12 can be attached or fitted to structural foam cores 8, 9 by any other suitable means. For example, adhesives, stitching, clamps and suitably designed clips can also be used to attach the fabric layers 12 to the foam cores. Thus, the invention is not limited to the specific attachment method disclosed in the Lewit '066 and '591 patents.

Those skilled in the art will appreciate that the composite panel as described herein can serve in a wide variety of applications wherein a panel must be capable of withstanding point compressive loads without deformation. For example, in one embodiment the panel can be used to form a boat transom. In that case, a plurality of fabric flaps 25 can be positioned around the outer edges of the fabric layer 12, in order to permit the transom to be laminated into a boat construction. The flaps 25 are preferably formed of the same reinforcing material as fabric 12. Likewise, the channels inserts 16 may further include flaps 20 as shown that would allow for a smoother surface transition between the channel insert 16 and panel forming the

composite panel. The flaps 20 would preferably be formed of the same reinforcing material as fabric 12 or 18.

The method of making the composite structure in accordance with the invention is illustrated in FIGS. 2, 3, and 4. Referring now to Fig. 4, a structural foam panel 10 is formed is formed in step 26. The panel 10 has elongated channels 14 formed therein that are positioned along areas of anticipated point compression loading. The structural foam panel 10 includes an outer fabric layer 12 which is formed and attached as described above. At step 27, structural foam channel inserts 16 are formed having an outer fabric layer 18 and fabric flaps 20. The channel inserts 16 have a cross section that matches the cross-sectional profile of each of the elongated channels 14. The foam cores 8 and 9 of channel inserts 16 and panel 10 are preferably formed from low-density urethane foam as described above.

In step 29, at least the mating portions of the fabric layers 12, 18 of the panel 10 and the channel inserts 16 are wet out with resin. In accordance with step 31, the channel inserts 16 are then positioned within the channels 14. According to step 31, the resin is allowed to cure, forming the composite structure. Further, if only the mating portions are wet out with resin, then the remainder of the structure remains free of resin. Advantageously, a composite structure formed in accordance with these inventive steps can withstand point compression loads. For example, the composite structure can accommodate a bolt or an outboard motor clamp.

An alternative embodiment of the invention is shown in Figs. 5-7. In Figs. 1-4 and 5-7, elements commonly represented are designated by the same reference numerals. Referring now to Fig. 5 and 7, a composite panel 51 is illustrated. As best shown in Fig. 7, composite panel 51 is comprised of a foam core 52 and a point compressive load-bearing member 54 as shown in Fig. 6a. Load bearing member 54 is preferably formed of metal or other rigid materials sufficient to resist point compressive loading applied transversely to opposing panel surfaces 13 and 15. For example, it can be formed of steel, aluminum or any other suitable metal or alloy. In a preferred embodiment, the load-bearing member can have a square or rectangular profile as shown. However, the invention is not limited in this regard and any other suitable cross-sectional profile can also be used.

The load-bearing member 54 is positioned between opposing fabric layers 12. Referring to FIG. 7, a bolt 60 is optionally shown illustrating a condition of point compression loading upon the composite panel 51. The bolt 60 would be secured in place through the load-bearing member 54 using washers 61 and 62 and corresponding bolt 64. According to a preferred embodiment, the surfaces of the load-bearing member are in contact with fabric layers 12 traversing the surfaces 13, 15 of the panel 51. A structural foam core 8, 9 preferably is injected to fill the remaining space between opposing fabric layers and within the load-bearing member as shown. The fabric 12 and foam core 8, 9 are preferably formed of the materials as described above. It should be understood that it may not be necessary to fill the load bearing member 54 with foam and the interpretation of the scope of the claims should not be limited in this respect.

According to one embodiment, the panel 51 can be formed by positioning reinforcing members 54 and fabric layers 12 in a mold, and injecting the mold with foam as described in U.S. Patent No. 5,429,066 to Lewit. The foam can then be permitted to cure to form a composite article that has an exposed reinforcing fabric layer that is ready to be laminated into a larger composite structure such as a boat.

According to another embodiment, pre-formed structural foam panels 56 can be arranged on adjacent sides of each load-bearing member 54 as shown in FIG. 5. Subsequently, an outer fabric layer can be attached or fitted around the entire assembly of foam panels 56 and load bearing members. The panel can then be immediately wetted out with resin and allowed to cure to form a rigid foam core panel. Alternatively, the entire assembly can be clipped, clamped or otherwise held together by suitable fasteners, without applying resin, such that the panel 51 has an exposed reinforcing fabric layer 12 which is free of resin and suitable for lamination into a larger composite structure such as a boat, cargo container, truck side panel or wall panel, among other composite structures.

We claim:

1. A method of forming high strength panels suitable for use in applications requiring a capability to withstand point compression loading without deformation, comprising the steps of:

providing a panel having elongated channels formed therein which are positioned along areas of anticipated point compression loading, said panel arranged and constructed to form an outside layer having a foam core therein;

providing structural foam channel inserts having an outer fabric layer and a foam core, wherein the channel inserts have a cross section which matches the cross-sectional profile of each of the elongated channels of the panel;

applying resin to at least mating portions of the outside layer of the panel and the outer fabric layer of the channel inserts;

positioning the channel inserts within the channels of the panel and allowing the resin to cure forming a composite structure.

2. The method of claim 1, wherein the panel is constructed by attaching a reinforcing fabric layer to non-woven fabric layer forming the outside layer.

3. The method of claim 1, wherein outer fabric layer of the structural foam channel inserts further comprises fabric flaps.

4. The method of claim 1, wherein the composite structure can resist deformation under conditions of point compression loading along an axis perpendicular to the panel surfaces.

5. The method of claim 1, wherein the foam core of the channel inserts and the panels are made of low-density urethane.

6. The method of claim 1, wherein the outer fabric layer of the structural foam inserts and the outside layer of the panel are arranged to continuously extend

between a first surface of the panel to a second surface of the panel, so as to traverse through the foam core.

7. The method of claim 6, wherein the mating portions of the outer fabric layer of the structural foam inserts and the outside layer of the panel form a rigid cross brace between the first panel surfaces and second panel surface after the resin on the mating portions is allowed to cure, wherein the rigid cross brace resists deformation under conditions of point compression loading applied along an axis perpendicular to the panel surfaces.

8. The method of claim 1, wherein the fabric layer is selected among the group of directional reinforcing fabric layers of organic or inorganic structural reinforcing fabrics consisting of fiberglass, carbon fibers, aramid fibers, linear polyurethane fibers, polypropylene fibers, or polyester fibers or any combination thereof.

9. The method of claim 1, wherein an inner fabric layer formed within the fabric layer is a non-woven fabric composed of continuous thermoplastic fiber, needle punched together to yield a felt-like fabric.

10. The method of claim 1, wherein an inner fabric layer formed within the fabric layer is composed of materials selected from the group including polyester staple mat, glass fiber mat, or other organic and inorganic fiber mats and fabrics.

11. The method of claim 1, wherein the foam core is formed of a self-expanding, self-curing urethane foam which has been caused to expand into the interstices of an inner one of the fabric layers by having been filled into a mold in an amount sufficient to cause pressure as a result of expansion of the foam cores to penetrate into the interstices of the inner fabric layer.

12. The method of claim 11, wherein the foam core is an MDI-based rigid polyurethane foam (methylene-diphenyl-methane diisocyanate) using "hydrogenated chlorofluorocarbons" (HCFC), water and/or CO_2 as a blowing agent.

13. A method of forming high strength panels suitable for use in applications requiring a capability to withstand point compression loading without deformation, comprising the steps of:

providing a panel by attaching a reinforcing fabric layer to a non-woven fabric layer forming an outside layer, wherein the outside layer forms opposing panel surfaces;

arranging a plurality of point compressive load bearing members between the opposing panel surfaces along areas of anticipated point compression loading, wherein the plurality of point compressive load bearing members forms elongated channels which are applied transversely to opposing surfaces of the panel; and

securing the plurality of point compressive load bearing members in place within the panel by injecting the panel with foam while constraining the opposing panel surfaces in providing a foam core to the panel.

14. The method of claim 13, wherein the method further comprises the step of allowing the foam to cure to form a composite article having an exposed reinforcing fabric layer.

15. The method in accordance to claim 14, wherein the composite article having an exposed reinforcing fabric layer is laminated into a larger composite structure.

16. The method of claim 13, wherein the outer layer of the point compressive load bearing member is selected from the group of materials including steel, aluminum or any other suitable metal or alloy.

17. The method of claim 13, wherein the outer layer of the point compressive load bearing member has a square cross-sectional profile.

18. The method of claim 13, wherein the outer layer of the point compressive load bearing member has a rectangular cross-sectional profile.

19. A composite structure, comprising:

a panel having elongated channels formed therein which are positioned along areas of anticipated point compression loading, wherein the panel is arranged and constructed by attaching a reinforcing fabric layer to a non-woven fabric layer forming an outside layer;

a plurality of structural foam channel inserts, each insert formed from attaching a reinforcing fabric layer to a non-woven fabric layer to form an outside layer, wherein the channel inserts have a cross section which matches the cross-sectional profile of each of the elongated channels of the panel;

a structural foam attached to the non-woven fabric layer of each of the panel and the plurality of structural foam channel inserts, wherein the structural foam fills interstices of the non-woven fabric layer without penetrating into the reinforcing fabric layer;

wherein the plurality of structural foam inserts are mated with the elongated channels of the panel after being saturated with curable resin after the structural foam has been attached to the non-woven fabric layer of each of the channel inserts and of the panel.

20. The composite structure of claim 19, wherein the composite structure is used to form a boat transom, wherein the composite structure further comprises

a plurality of fabric flaps positioned around the outer edges of the fabric layer of the panel to permit the boat transom to be laminated into a boat construction.

COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME

Abstract

A method for making a composite panel includes the step (26) of providing a panel having elongated channels (14) that are positioned along areas of anticipated point compression loading. The panel (10) has a reinforcing fabric layer (41) attached to a non-woven fabric layer (43) forming an outside layer (12). The composite panel has foam core (8,9) within the outside layer. The method further comprises the step (27) of providing structural foam channel inserts (16) having an outer fabric layer (18), wherein the channel inserts have a cross section which matches the cross-sectional profile of each of the elongated channels of the panel. Resin is then applied to the outside layer of the panel and outer fabric layer of the channel inserts such the channel inserts are positioned within the channels of the panel (29 and 31). The resin is then allowed to cure (33) forming a composite structure.

Fig. 1B

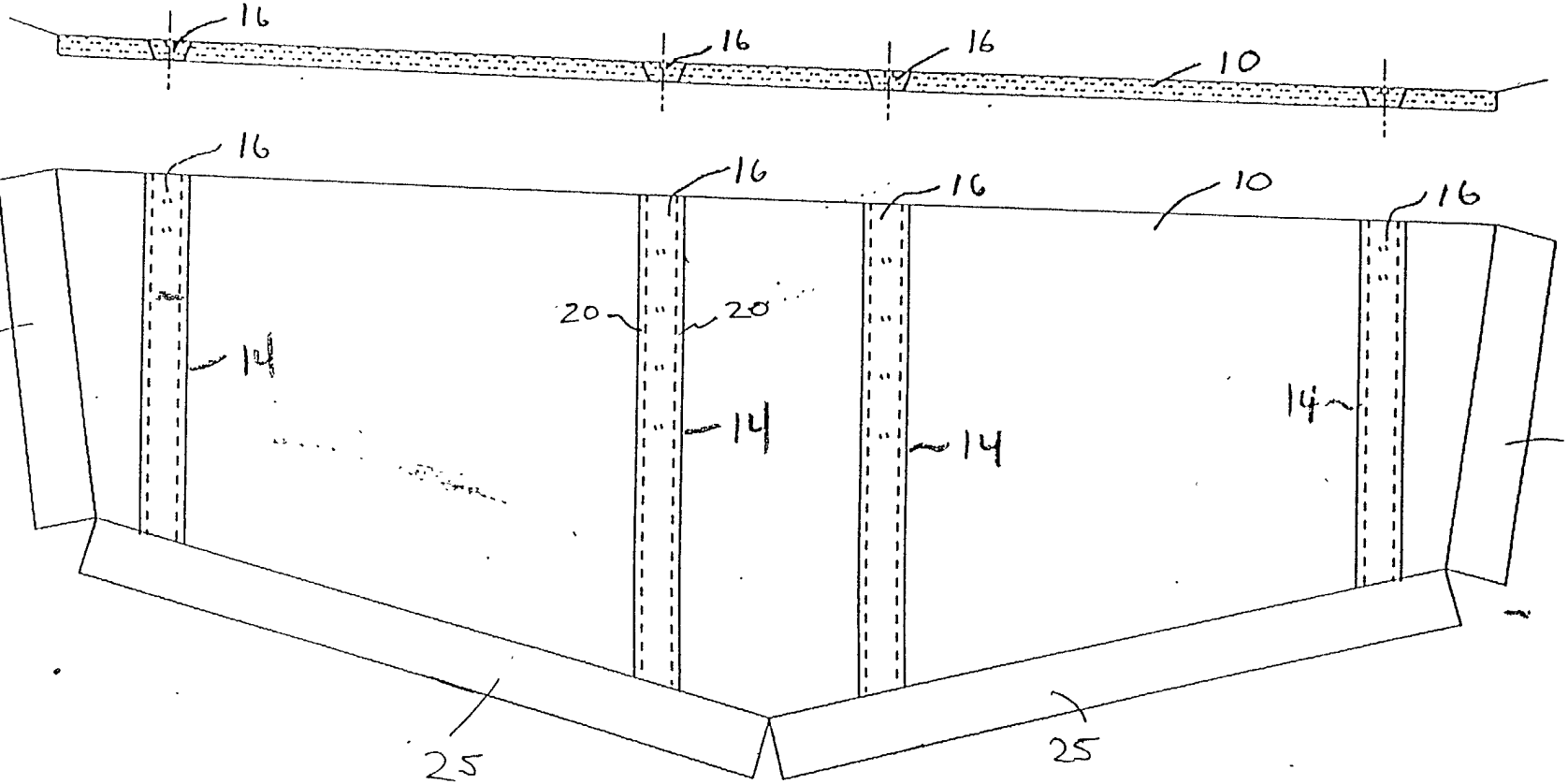
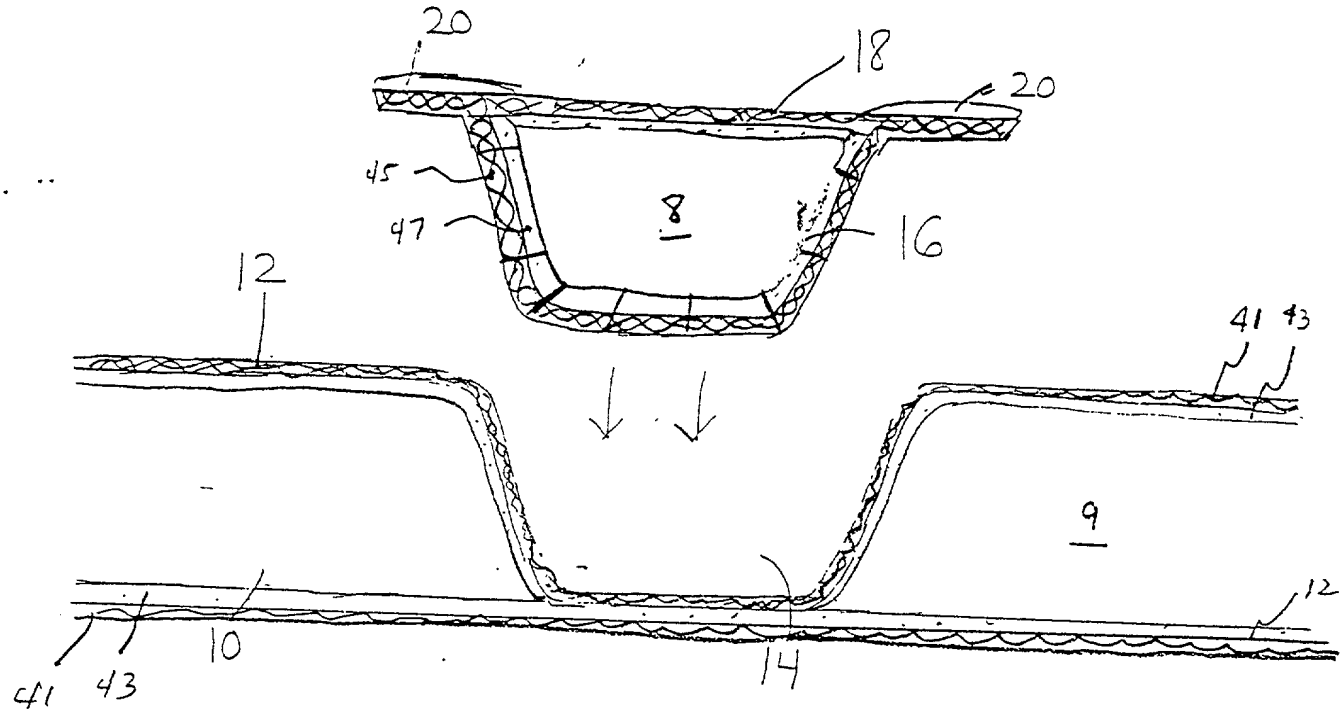


Fig. 1A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14
41
43

FIG. 2

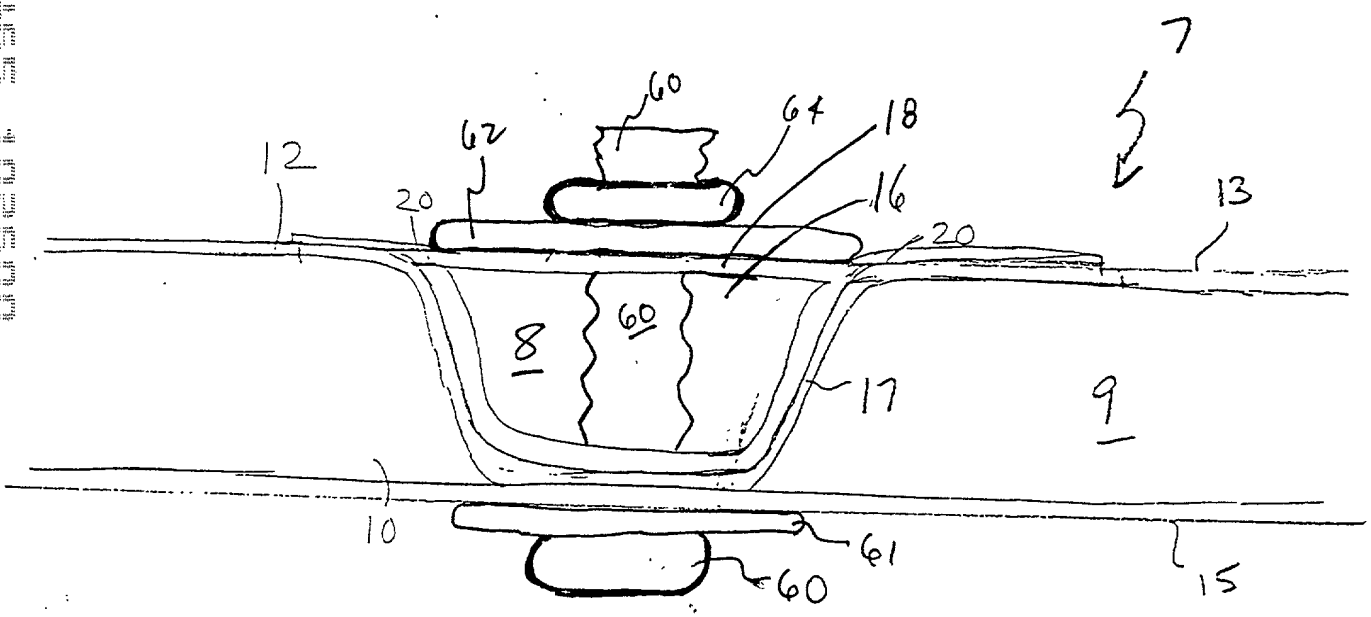
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FIG. 3

FIG. 4

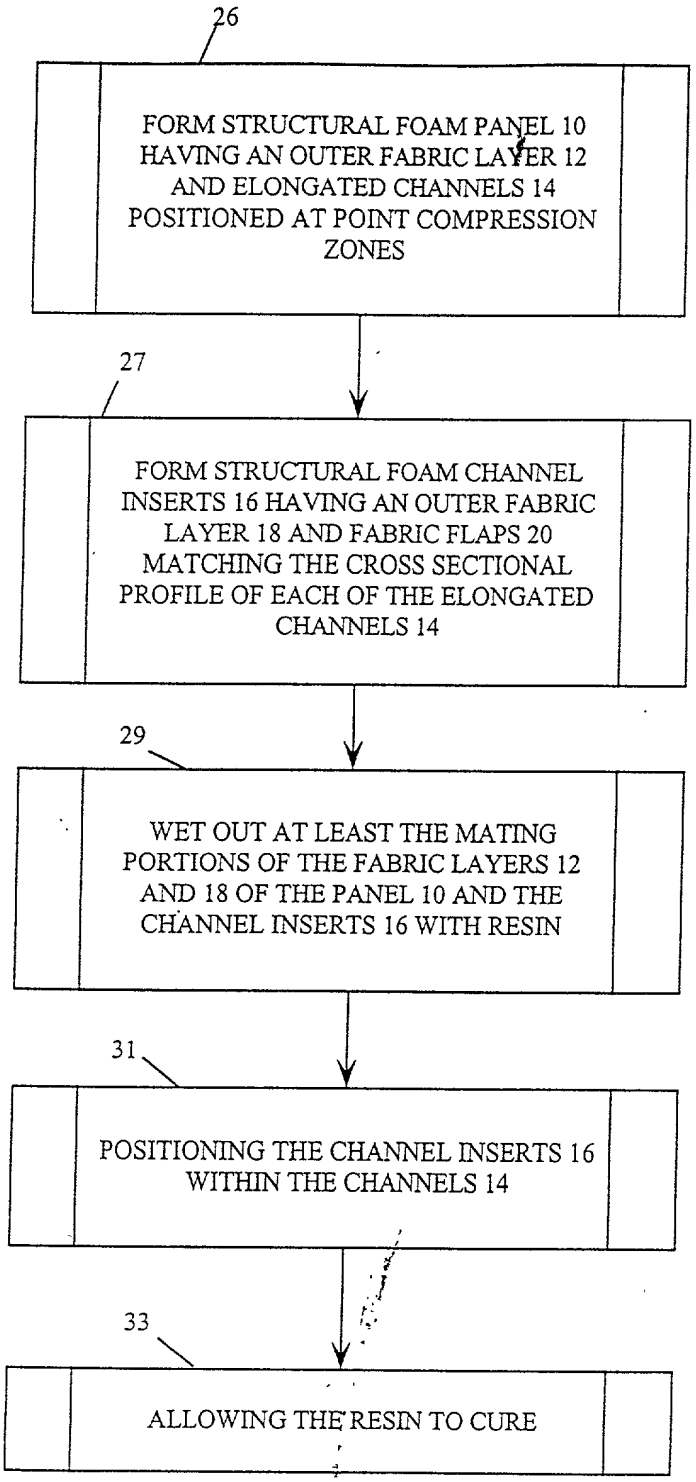
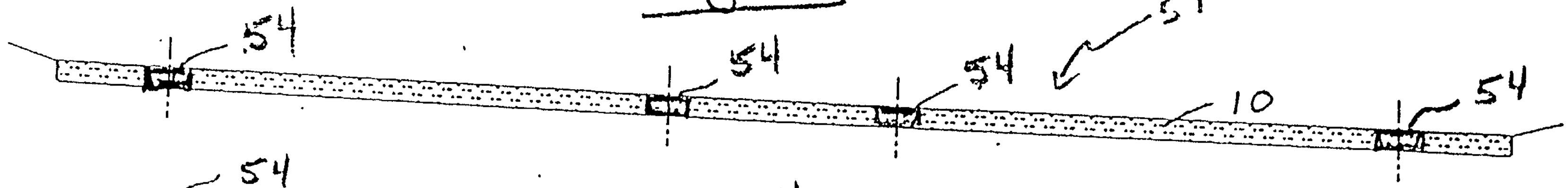

26
FORM STRUCTURAL FOAM PANEL 10 HAVING AN OUTER FABRIC LAYER 12 AND ELONGATED CHANNELS 14 POSITIONED AT POINT COMPRESSION ZONES
27
FORM STRUCTURAL FOAM CHANNEL INSERTS 16 HAVING AN OUTER FABRIC LAYER 18 AND FABRIC FLAPS 20 MATCHING THE CROSS SECTIONAL PROFILE OF EACH OF THE ELONGATED CHANNELS 14
29
WET OUT AT LEAST THE MATING PORTIONS OF THE FABRIC LAYERS 12 AND 18 OF THE PANEL 10 AND THE CHANNEL INSERTS 16 WITH RESIN
31
POSITIONING THE CHANNEL INSERTS 16 WITHIN THE CHANNELS 14
33
ALLOWING THE RESIN TO CURE

Fig. 5B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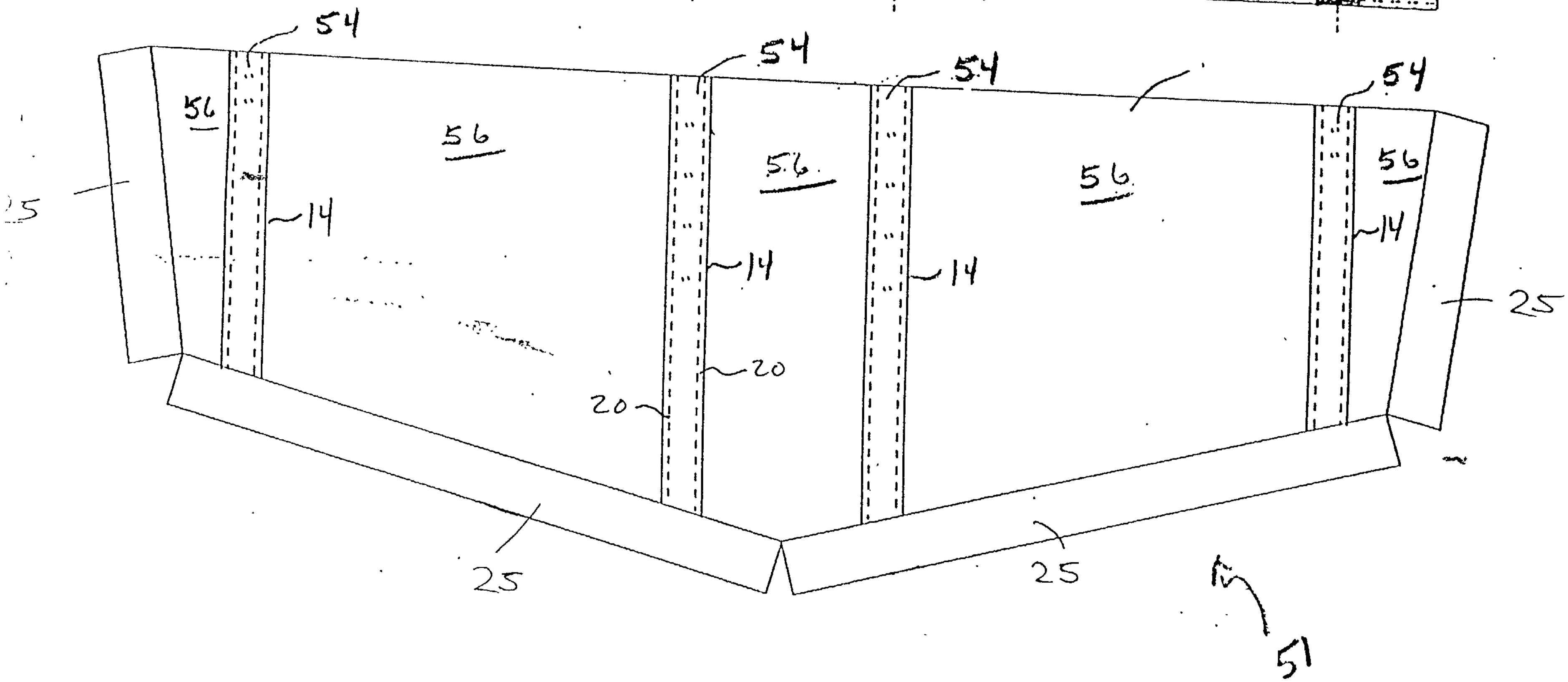
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Fig. 5A

FIG. 6a

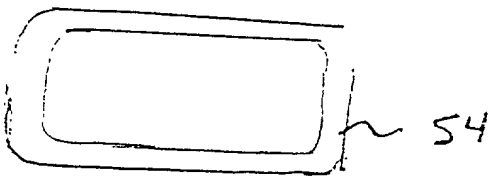


FIG. 6b

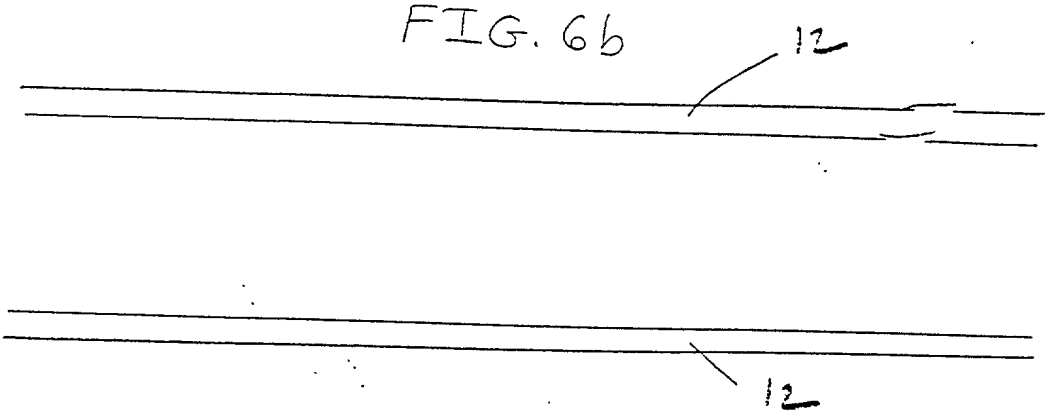
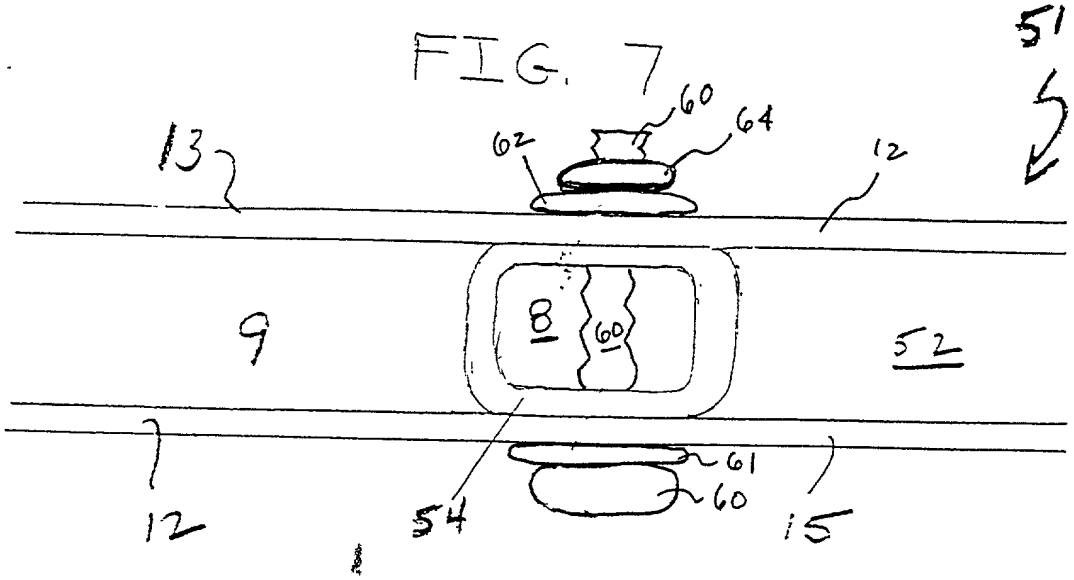


FIG. 7



DECLARATION FOR PATENT APPLICATION

Docket: 5785-23

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled COMPOSITE PANEL ADAPTED FOR POINT COMPRESSIVE LOADS AND METHOD FOR MAKING SAME

the specification of which (check one)

X is attached hereto.

___ was filed on_____ as Application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
(Number)	(Country)	(Day/Month/Year Filed)	Yes No
(Number)	(Country)	(Day/Month/Year Filed)	Yes No

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

60/161,561	10/26/99	PENDING
(Appln. Serial No.)	(Filing Date)	(Status-patent, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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EE444326364US Express

I hereby appoint J. Rodman Steele, Jr., Registration No. 25,931; Gregory A. Nelson, Registration No. 30,577; Joseph W. Bain, Registration No. 34,290; Robert J. Sacco, Registration No. 35,667; Stanley A. Kim, Registration No. 42,730; Mark D. Passler, Registration No. 40,764; Steven M. Greenberg, Registration No. 44,725; Larry G. Brown, Registration No. 45,834; Neil R. Jetter, Registration No. 46,803; and Kevin T. Cuenot, Registration No. 46,283; as attorneys with full power of substitution and revocation to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, to amend the specification, to appeal in case of rejection, as they may deem advisable, to receive the patent when granted and generally to do all matters and things needful in the premises as fully and to all intents and purposes as I could do.

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